

Reading Comprehension Assignment

Mitosis is the portion of the cell cycle following interphase. During mitosis, a mother cell duplicates the chromosomes in its nucleus and produces two daughter nuclei which are identical to the mother. Mitosis and cytokinesis together make up the mitotic (M) phase of the cell cycle. Mitosis is a highly regulated process that is quite complex. The events of mitosis are divided into four phases which are, in order, prophase, metaphase, anaphase, and telophase. During mitosis, the pairs of chromosomes condense and attach to fibers. The sister chromatids are pulled to opposite poles of the cell by the fibers.

Although mitosis is often used interchangeably with mitotic phase (the combination of mitosis and cytokinesis), mitosis and cytokinesis occur separately in many cells, forming single cells that have multiple nuclei. Mitosis is important because by the process the parent cell divides into two complete daughter cells. The daughter cells contain chromosomes, which are tightly wound DNA molecules that contain genetic information about cellular functions. The chromosomes replicate themselves during interphase, and during mitosis DNA is replicated. The replication of the chromosomes results in two sets of identical copies called chromatids. The chromatids are attached at the centromere. These sister chromatids are not considered chromosomes themselves.

In animal and plant cells, the nuclear membrane that separates the DNA from the cytoplasm breaks down and spills its fluid into the cytoplasm. The chromosomes line up along an imaginary equator and microtubules extend from opposite poles of the cell and pull apart the sister chromatids of each chromosome as the microtubules shorten. Each sister chromatid is considered a chromosome after the pair is pulled apart, and the copies of the original chromosome become sister chromosomes. The cell then elongates and pulls the sister chromosomes to opposite ends of the cell. After this, a new nuclear envelope develops around each sister chromosome. As a result of mitosis, two nuclei, each with an identical set of chromosomes, have formed.

The next phase of the cell cycle is *cytokinesis*, which is the division of the cytoplasm. In animal cells, the two developing nuclei are separated as the cell constricts and forms two daughter cells with their own organelles. In plant cells, a new cell wall develops between the daughter cells.

Questions:

1. What part of the cell cycle precedes mitosis?
2. The mitotic phase of the cell cycle is the combination of mitosis and what other process?
3. What is the name for the sets of identical copies of chromosomes?
4. In what type of cell does a cell wall develop during cytokinesis?
5. What condenses and attaches to fibers during mitosis?
 - a) DNA
 - b) centromeres
 - c) pairs of chromosomes
 - d) cytoplasmic
6. What are tightly wound DNA molecules that contain important cell information called?
 - a) centromeres
 - b) chromosomes
 - c) chromatids
 - d) microtubules
7. Where do sister chromatids attach to each other?
 - a) centromere
 - b) spindle
 - c) microtubule
 - d) cytoplasm
8. What pulls apart the sister chromatids?
 - a) centromeres
 - b) microtubules
 - c) cytoplasm
 - d) DNA
9. At the end of mitosis, what develops around each set of chromosomes?
 - a) cytoplasm
 - b) DNA
 - c) cell wall
 - d) nuclear envelope
10. What is the end result of mitosis?
 - a. Two new cells with identical sets of chromosomes
 - b. Two new cells with different sets of chromosomes
 - c. One cell with two identical sets of chromosomes
 - d. One cell with two different sets of chromosomes